Philadelphia Refinery

Philadelphia Energy Solutions
Refining and Marketing LLC
3144 Passyunk Avenue
Philadelphia, PA 19145-5299
215-339-2000

Certified Mail: 7012 1010 0000 6781 2224

July 29, 2014

Director, Air Enforcement Division
Office of Civil Enforcement
U. S. Environmental Protection Agency
Mail Code 2242-A
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460-0001

RE: USA v. Sunoco, Inc. et. al. - Civil Action No. 05 CV-02866
Philadelphia Energy Solutions Refining and Marketing LLC
Philadelphia Refinery
Semi-Annual Progress Report #17 – 2014 January-June

Dear Sirs:

Pursuant to Paragraph #114 of the Consent Decree entered in the above-noted Civil Action, enclosed is Philadelphia Energy Solutions Refining and Marketing LLC's (PESRM) semi-annual progress report, the seventeenth report for this facility and the third under full PES ownership.

On September 8, 2012, PESRM acquired the Philadelphia Refinery Property from Sunoco. On August 17, 2012, a Fourth Amendment to the CD was lodged in the US District Court for the Eastern District of Pennsylvania requiring the transfer of all provisions of the CD as they apply to the Philadelphia Refinery to PESRM as of the Date of Entry. The Fourth Amendment was entered on April 18, 2013.

Should you have any questions concerning the enclosed report, please contact me at 215-339-2074.

Sincerely,

Charles D. Barksdale Jr.
Philadelphia Energy Solutions Refining and Marketing LLC
Site Environmental Director

RE: USA v. Sunoco, Inc. et. al. - Civil Action No. 05 CV-02866
Philadelphia Energy Solutions Refining and Marketing LLC
Philadelphia Refinery
Semi-Annual Progress Report #17 – 2014 January-June

I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my directions and my inquiry of the person(s) who manage the system, or the person(s) directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete.

Signed: _____ Date: 7/29/14
James A. Keeler
Philadelphia Energy Solutions Refining and Marketing LLC
Point Breeze VP and General Manager

Signed: _____ Date: 7/29/14
Nithia Thaver
Philadelphia Energy Solutions Refining and Marketing LLC
Girard Point VP and General Manager

cc: Mr. James Rebarchak
Air Program Manager
Bureau of Air Quality
Southeast Regional Office
2 East Main St
Norristown PA 19401

Philadelphia Air Management Services
321 University Ave 2nd Floor
Philadelphia PA 19104

File: Global Settlement Periodic Reports 2014

Facility: Philadelphia
Report Title: Semi-annual Consent Decree Compliance Report #17/#3 (PES)
Reporting Period: 01/01/14 – 06/30/14

Paragraph 114 Reporting and Recordkeeping of Affirmative Relief / Environmental Projects and Emission Data in Section V with Certification

I. Progress Report for Implementation of (Section V) Affirmative Relief/Environmental Projects

A. NOx Emissions Reductions from the FCCU

Paragraphs 12 – 13: There were no NOx exceedances of the CD limits during the period. As discussed in previous updates submitted in accordance with the amended CD (via email), Sunoco used Low NOx Combustion Promoter at the 868 FCCU for the first time on April 28, 2011 and the first time the Low NOx Combustion Promoter was added after the Date of Lodging of the Second Amendment was July 15, 2011. Quarterly email updates on the impact of the Low NOx Combustion Promoter were provided to the agencies. On February 18, 2013, PES submitted the final report on the 18 month study required by the Second Amendment. As part of that report and as required by the Second Amendment, PES established new NOx limits that were immediately effective:
7 day average: 100 ppmvd NOx (corrected to 0% oxygen)
365 day average: 50 ppmvd (corrected to 0% oxygen)
No exceedances of the 7 day average limit occurred since the establishment of the limit. Compliance against the 365 day average limit was first determined after 365 days, starting on February 19, 2014.

B. SO2 Emissions Reductions from the FCCU

Paragraphs 14 – 15: The Philadelphia Refinery is compliant with the requirements of these paragraphs. There were no SO_2 exceedances of the CD limits during the period.

C. Control of PM Emissions from FCCU

Paragraph 16 – The Philadelphia Refinery is compliant with the requirements of this paragraph. However, on January 29, 2014, a malfunction occurred throughout the refinery from the unplanned and sudden loss of steam that led to 3 hours of excess opacity. On May 27, 2014, problems with the soot blowers led to elevated opacity for one hour that exceeded the permit limits. During these events, no exceedance of the particulate coke burn limit occurred.

D. Control of CO Emissions from FCCU

Paragraph 19 – There were no consent decree CO exceptions noted during the reporting period pursuant to paragraph 19. However, the CO lbs/hour limits were exceeded for five hours at the 868 FCCU and 3 hours from the 1232 FCCU from a malfunction associated

with the loss of steam on January 29, 2014. The 868 and 1232 FCCUs were also above 500 ppm for five hours during this malfunction. During the 868 FCCU startups of March 24 and April 4, the 500 ppm limit was exceeded for 3 and 2 hours respectively, but these startup exceedances are excluded from the Consent Decree.
Paragraph 20 – Philadelphia Refinery is compliant with the requirements of this paragraph.

E. NSPS Subparts A and J Applicability at FCCU Regenerators

Paragraphs 24 – 25: There were no Subpart A or J exceptions during the reporting period. However, as indicated previously, on January 29, 2014, a malfunction occurred throughout the refinery from the unplanned and sudden loss of steam that led to 3 hours of excess opacity, and 5 hours of elevated CO. On May 27, 2014, problems with the soot blowers led to elevated opacity for one hour that exceeded the permit limits but not the subpart J limit.

F. NO_x Emission Reductions from Heaters and Boilers

Paragraphs 26-35 On September 8, 2012, Philadelphia Energy Solutions (PES) acquired the Philadelphia Refinery Property from Sunoco. On August 17, 2012, a Fourth Amendment to the CD was lodged in the US District Court For The Eastern District Of Pennsylvania requiring the transfer of all provisions of the CD as they apply to the Philadelphia Refinery to PES as of the Date of Entry (April 13, 2013). This amendment allows temporary backup operation of Boiler # 38 until August 31, 2014. All other works relative to the heater/boiler NOx requirements has been completed. PES has not operated Boiler #38 and has decided to not operate it.

G. SO_2 Emissions Reductions from and NSPS Applicability for Heaters and Boilers

On December, 31, 2010, all refinery heaters and boilers became subject to NSPS J. Sunoco submitted a plan approval application to Philadelphia Air Management Services to incorporate these limits into a permit. A draft of this permit was received in July, 2011 and a final permit was received September 23, 2011.

Paragraphs 36 – 38: In accordance with the Consent Decree Appendix D, all remaining refinery heaters and boilers became subject to NSPS Subpart J. No exceedances of these limits occurred during the reporting period. However, on January 29, 2014, a malfunction occurred throughout the refinery from the unplanned and sudden loss of steam that led to two hours of excess hydrogen sulfide in refinery fuel gas in three refinery boilers and fourteen heaters and one hour of excess hydrogen sulfide for two refinery heaters.

All RICE equipments listed in paragraph 38A of the amended Consent Decree were either permanently removed or replaced with an equivalent electrical engine by December 31, 2011.

I. Sulfur Recovery Plants - NSPS Applicability

Paragraphs 40 – 47: The Philadelphia Refinery is compliant with the requirements of these paragraphs.

J. Hydrocarbon Flaring Devices

Paragraphs 48 – 50: The following is a summary of options the Philadelphia Refinery has elected to comply with regarding the CD NSPS requirements for flares.

Philadelphia Flares	Compliance Status
PB North Yard LPG Flare	NSPS. Have an approved AMP. Please note that a request to revise this approved AMP was submitted to USEPA and approved by them in April, 2010.
PB South Yard North Flare	NSPS. Operating and maintain a flare gas recovery system.
PB 867 Acid Gas Flare	NSPS. This is not currently a fuel gas combustion device. The purge and pilot gas is normally comprised of purchased natural gas. The purge and pilot gas can occasionally be refinery fuel gas, and during that time, that gas will be monitored to be compliant with Subpart J. The flare only receives non-routinely generated gases; process upset gases, fuel gas released as a result of relief valve leakage or gases released due to other emergency malfunctions.
PB 867 SWS Gas Flare	NSPS. This is not currently a fuel gas combustion device. The purge and pilot gas is normally comprised of purchased natural gas. The purge and pilot gas can occasionally be refinery fuel gas, and during that time, that gas will be monitored to be compliant with Subpart J. The flare only receives non-routinely generated gases, process upset gases, fuel gas released as a result of relief valve leakage or gases released due to other emergency malfunctions.

GP 1231/1232 Flares	NSPS status began 12/31/2010. AMP submitted in July, 2010 and approved by EPA in June, 2011.
GP 433 Flare	NSPS status began 12/31/2010. AMP submitted in July, 2010 and approved by EPA in June, 2011.

K. Control of Acid Gas Flaring and Tail Gas Incidents

Paragraphs 51 – 63: Acid gas flaring computational methods have been in place since the DOE. There were no AG flaring events to note for this reporting period.

L. Control of Hydrocarbon Flaring Incidents

Paragraph 64: Three Hydrocarbon Flaring Incidents occurred during this reporting period. The first event occurred during the January 29, 2014 steam loss event mentioned previously. The second event occurred on April 8 and is related to problems during the startup of several Point Breeze operating areas and the third event occurred on April 21 when a crude gas compressor shutdown while the spare was undergoing maintenance. A copy of the Root Cause Failure Analysis report for each event is included in Appendix I.

M. Benzene Waste NESHAP Program Enhancements

Paragraphs 65-77

1. **The following BWON training was conducted over this semi-annual period: (a) Site BWON Coordinator received annual training on sampling and analysis procedures; and (b) Environmental Coop was trained on proper BWON sampling methods and procedures and passed our internal test.**

2. **The BWON exempted quantity was calculated to be, based on EOL sampling data, 0.04 MG for the first quarter and 0.22 MG for the second quarter of 2014. The projected 2014 annual BWON exempted quantity, based on EOL sampling is calculated to be 0.52 MG. See Appendix II for EOL sampling results.**

3. **A revised BWON EOL Sampling Plan for the Philadelphia Refinery was submitted on December 30, 2008. This revised sampling plan was approved by the EPA on 01/22/09, which resulted in relocating end-of-line sampling point GP EOL-001 and adding sample point GP EOL-006.**

N. Leak Detection and Repair Program Enhancements

Paragraphs 78-89 and 91-92: The Philadelphia Refinery is compliant with the requirements of these paragraphs.

The LDAR coordinator temporarily changed from Carolyn Ruch to Robert Schweikart on April 15, 2014. On June 30, 2014, Abdul Bamgbose was hired as the new LDAR coordinator.

As reported in the semiannual report for the previous reporting period, all of the eight (8) corrective actions for audit findings identified in the 2012 LDAR Third Party Compliance Audit have been completed. Pursuant to Paragraph 80, another third party audit is scheduled for the second half of 2014.

Information required under Paragraph 92(c) will be submitted in the 2014 first semiannual report required under 40 CFR 63.655.

O. Incorporation of Consent Decree Requirements into Federally Enforceable Permit(s)

Paragraphs 93-96: The Philadelphia Refinery is compliant with the requirements of these paragraphs. Please note that in March, 2011, the Refinery submitted a plan approval application to incorporate NSPS J requirements on all remaining refinery heaters, boilers and flares. A final permit was received from AMS on September 23, 2011. New permit limits for the 1232 FCCU required by the second CD amendment were incorporated into a draft plan approval that was issued as final by Philadelphia AMS on July 30, 2012.

Paragraph 99A (added as part of 4th Amendment): The Philadelphia Refinery is compliant with the requirements of this paragraph.

Paragraph 113A Fenceline Monitoring (added as part of 4th Amendment) – a consultant was hired to prepare the Fenceline Monitoring Plan that must be submitted to EPA and AMS by April 12, 2014 (360 days from Date of Entry of 4th Amendment). The plan was reviewed with the Refinery Community Advisory Panel on March 6, 2014 and submitted to USEPA and AMS on April 11, 2014. Comments were received on July 1 from USEPA and AMS.

II. Summary of (Section V) Emissions Data

Included herein.

III. Description of Any Problems Anticipated with Meeting (Section V) Requirements

None

IV. Additional Matters to be Brought to the Attention of EPA and the Appropriate Plaintiff/Intervenor

None

Paragraph 112 SUPPLEMENTAL AND COMMUNITY ENVIRONMENTAL PROJECTS (SCEP) AND STATE AND LOCAL ENVIRONMENTALLY BENEFICIAL PROJECTS (SLEBP) in Section VIII with Certification

I. Progress Report for Each SCEP or SLEBP (Section VIII)

Paragraph 104: All required work was completed during the second half of 2011 and the SCR unit for the H-400 and H-401 heaters was in service on December 30, 2010. Some minor work post construction punch list work was completed in the first half of 2011 and some minor touch up painting was completed in the third quarter of 2011.

Paragraph 105: Completed

Paragraph 106: Completed

Paragraph 107: Completed

Paragraph 108: Completed

Paragraph 109: Completed

Paragraph 110: A cost report for the SCR unit for the H-400 and H-401 heaters was submitted in January 2012.

II. Completed SCEP or SLEBP (Section VIII)

A. Detailed Description of Each SCEP or SLEBP Project as Implemented

None

B. Brief Description of Any Significant Operating Problems Encountered

None

C. Certification That Each Project Has Been Fully Implemented Pursuant to the Provisions of this Consent Decree

If applicable, see the certification behind the cover letter.

D. Description of the Environmental and Public Health Benefits Resulting From Implementation of Each Project (including quantification of the benefits and pollutant reductions, where practicable)

N/A

APPENDIX I

ROOT CAUSE FAILURE ANALYSIS REPORTS

January 29, 2014

April 8, 2014

April 21, 2014

Investigation Report for Acid Gas, Sour Water Gas, Tail Gas, or Hydrocarbon Flaring Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	May 8, 2014	**Incident Type:** (Check one)	☐ Acid Gas Flaring: ☐ Tail Gas Flaring: ☒ Hydrocarbon Flaring:
Date(s) of Incident:	(Beginning) 1/29/2014 (End) 1/29/2014	1st Flaring start/end time:	(start) 1:25 AM (end) 5:30 PM
		2st Flaring start/end time:	(start) (end)
		3st Flaring start/end time:	(start) (end)
Amount of SO_2 Released:	698 Pounds ☒ Tons ☐	**Location at the Philadelphia Refinery:** Point Breeze Refinery Units	SWS Flare ☐ 1231/2 Flare ☒ AG Flare ☐ SY S Flare ☐ North Flare ☐ 433 Flare ☐ SY N Flare ☒

Incident Description:

At ~1:10 AM, the 1232 FCCU CO Boiler tripped. The cause was a mechanical failure of the air supply line to the Fuel Gas Emergency Shutdown (ESD) valve. The refinery responded with changes in operation to handle the lost steam production. At ~1:26 AM the 1232 FCC unit tripped due to activation of the Main Frac high pressure ESD. The cause was a slug of water to the riser, apparently from a change in flow balance on the 680# steam header. This resulted in a loss of steam and fuel gas to the refinery and Operations took measures to shut down units to get the headers in balance. Natural gas supply to the fuel gas header was increased but the header pressure continued to drop. LPG was ultimately transferred from the SRTF back to the Fuel Gas Mix Drum at 531 Unit. This resulted in a rapid rise in the fuel gas header pressure and a trip of all 3 boilers at Number 3 Boilerhouse due to high fuel gas pressure. This lead to the complete shutdown of most units in the refinery.

As a result of various unit shutdowns and subsequent startups caused by the loss of steam, flaring at the 1231 Flare occurred for approximately 5.5 hours (over a 7.5 hour period) and at the Point Breeze South Yard South Flare for approximately 15.5 hours.

Steps taken to limit duration of flaring or quantity of SO2/Hydrocarbon released (Corrective Actions):

Operations made moves throughout the outage period to reduce flaring. The boilerhouse was quickly restarted to reduce duration of impacts.

Root Cause of Incident:

Mechanical failure of the air supply line to the 1232 FCCU CO Boiler.

Contributing Causes of Incident:

#3BH shutdown on high fuel gas pressure at the burners; Wet steam/condensate into riser at 1232; Fuel gas management – disruption and rapid swing in fuel gas pressure caused trip at #3BH;

Preventative Actions (Actions to reduce likelihood of Recurrence):

Finalize upgrade to COB Fuel Gas S/D valves – replace piping – install support for solenoid (support installed; other work ongoing)
Review design of Main Frac over-pressure S/D system – review HAZOP - identify any possible alternatives (completed – no changes needed)
Follow-up evaluation of 680# steam header – status of steam traps – evaluate overall steam trap monitoring program – (study complete; repairs underway)
Review control scheme at 3BH – Fuel Gas Pressure and Flow control valves – evaluate any possible modifications or tuning required (including Alarm Rationalization) (review completed; some changes being made)
Review/modify procedures for managing LPG from SRTF to 531 fuel gas mix drum (completed; no procedure changes needed)
Review/Update refinery procedures/guidelines for Steam and Fuel Gas emergencies (ongoing)
Conduct "tailgate" review with all 4 shifts at 1232/531 Units on the incident investigation, recommendations an status (complete)

Do Stipulated Penalties Apply? (Acid Gas Flaring Only) YES ☐ NO ☒

If YES explain:

- ☐ Yes ☐ No **Error resulting from careless operation.**
- ☐ Yes ☐ No **Failure to follow written procedures.**
- ☐ Yes ☐ No **Failure of equipment due to failure by Sunoco to operate and maintain equipment in a manner consistent with good engineering practices**
- ☐ Yes ☐ No **SO_2 rate greater than 20 lbs/hour continuously for 3 hours or more where SUNOCO did not follow PMO plan and took no action to limit duration and/or quantity of SO_2 emissions.**
- ☐ Yes ☐ No **More than five acid gas flaring incidents in rolling 12 months period.**

If NO explain:
Hydrocarbon Flaring Event

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐ **Completed:** ☐ **Not Completed:** ☒ **Explain: Most items have been completed. See details in Preventative Actions above. All work is currently scheduled to be completed by 12/31/2014.**

Approval Section		
Title	**Print Name**	**Date**
Technical Manager:	Pete Owens	5/8/2014
Environmental Manager:	Charles D. Barksdale Jr.	5/9/2014
Operations Director:	Mike Reed	5/9/2014

Investigation Report for Acid Gas, Sour Water Gas, Tail Gas, or Hydrocarbon Flaring Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	July 21, 2014	**Incident Type:** (Check one)	☐ Acid Gas Flaring: ☐ Tail Gas Flaring: ☒ Hydrocarbon Flaring:
Date(s) of Incident:	(Beginning) 04/08/2014 (End) 04/08/2014	**1st Flaring start/end time:**	(start) 12:00 AM (end) 11:59 PM
		2st Flaring start/end time:	(start) (end)
		3st Flaring start/end time:	(start) (end)
Amount of SO_2 Released:	0.6 Pounds ☐ Tons ☒	**Location at the Philadelphia Refinery:** North Complex	SWS Flare ☐ 1231/2 Flare ☐ AG Flare ☐ SY S Flare ☒ North Flare ☐ 433 Flare ☐

Incident Description:

The South Yard South flare flared intermittently throughout the day on April 8, 2014. During this time, the Point Breeze Refinery 866 Hydrodesulfurization (HDS) and 869 Sulfuric Acid Alkylation units were starting up. It appears the other HDS units (859 and 866) and the 868 Fluid Catalytic Cracking Unit were running steady at this time. Also during this time, the Point Breeze Fuel Gas Mix drum had developed a leak and was venting to the flare to prevent release to the atmosphere.

A review of the process data showed that there were swings in the flare line pressure. Normally, the 1C105 flare gas recovery compressor speeds to draw the pressure down, but 1C105 was unable to keep up with the elevated pressure so the flare trunion opened and flaring occurred. There may have been liquid accumulation between the flare and the 1C105 compressor, which inhibited the compressor's ability to pull in the flare line gas.

Steps taken to limit duration of flaring or quantity of SO2/Hydrocarbon released (Corrective Actions):

The 866 and 869 Units were following normal start-up procedures.
A work plan to repair the mix drum was developed.

Root Cause of Incident:

A partial freeze up or liquid accumulation between the flare and the 1C105 compressor while starting up two Point Breeze process units

Contributing Causes of Incident:
Throughout the winter, the flare system had liquid level build-up in the knock-out drums, pluggage and back-pressure problems in the low line.

Preventative Actions (Actions to reduce likelihood of Recurrence):

Strainers in the flare system were cleaned.
Lowline knock-out drum 3696 was cleaned
A pump on the knock-out leg was added to knock out drum 3700 to improve drainage.
The Point Breeze Fuel Gas Mix Drum was repaired and return to service.

Do Stipulated Penalties Apply? (Acid Gas Flaring Only) YES ☐ NO ☒

If YES explain:

- ☐ Yes ☐ No **Error resulting from careless operation.**
- ☐ Yes ☐ No **Failure to follow written procedures.**
- ☐ Yes ☐ No **Failure of equipment due to failure by Sunoco to operate and maintain equipment in a manner consistent with good engineering practices**
- ☐ Yes ☐ No **SO_2 rate greater than 20 lbs/hour continuously for 3 hours or more where SUNOCO did not follow PMO plan and took no action to limit duration and/or quantity of SO_2 emissions.**
- ☐ Yes ☐ No **More than five acid gas flaring incidents in rolling 12 months period.**

If NO explain:
Hydrocarbon Flaring Event

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐ **Completed:** ☒ **Not Completed:** ☐ **Explain: PB mix drum repairs were completed June 27, 2014.**

Approval Section		
Title	**Print Name**	**Date**
Operations Superintendent:	David Moyer	07/21/2014
Environmental Manager:	Charles D. Barksdale Jr.	07/21/2014
Operations Manager:	Ed Deni	07/25/2014

Investigation Report for Acid Gas, Sour Water Gas, Tail Gas, or Hydrocarbon Flaring Resulting in ≥ 500 lbs. of SO_2 Released

Date of Report:	July 17, 2014	**Incident Type:** (Check one)	☐ Acid Gas Flaring: ☐ Tail Gas Flaring: ☒ Hydrocarbon Flaring:
Date(s) of Incident:	(Beginning) 4/21/2014 (End) 4/22/2014	1st Flaring start/end time:	(start) 9:21 PM (end) 5:50 AM
		2st Flaring start/end time:	(start) (end)
		3st Flaring start/end time:	(start) (end)
Amount of SO_2 Released:	1289 Pounds ☒ Tons ☐	**Location at the Philadelphia Refinery:** 862 Light Ends Unit	SWS Flare ☐ 1231/2 Flare ☐ AG Flare ☐ SY S Flare ☒ North Flare ☐ 433 Flare ☐ SY N Flare ☐

Incident Description:

- **On 04/21/14 at approximately 9:37 PM, 862 Light Ends Unit 1C101B compressor motor shutdown. The spare 1C101A compressor was not available as it was out for maintenance.**
- **Prior to shut down the motor went into an overloaded alarm condition according to the Multilin motor protection relay**
- **Operators at 862 Unit attempted 3 unsuccessful starts between 21:37:20 hours and 22:36:14 hours.**
- **Rear motor cover was removed and showed that the diode wheel was damaged and three bolts holding the wheel in place were sheared off**
- **Stator and rotor were extremely contaminated with oil and dirt**
- **One rotor pole winding had one of its two retaining bolts top half sheared off**
- **Rotor pole dropped sufficiently to come in contact with the stator core and stator winding**
- **Evidence of rubbing and scorching was seen on 1/3 of the stator core and winding top sticks located from the 1 o'clock to the 6 o'clock region of the stator**

The 1C101 A and B compressors are used in the processing of 210 Crude Unit gas into refinery fuel gas. When they shutdown the crude gas is sent initially to the flare. The gas is moved to the 868 Fluid Catalytic Cracking Unit (FCCU) for processing with some gas continuing to be sent to the flare.

Steps taken to limit duration of flaring or quantity of SO2/Hydrocarbon released (Corrective Actions):

The most significant move was to send the crude gas to the 868 FCCU for processing. Crude rate was also lowered to reduce the production of crude gas. The flare gas recovery system also operated during this time but was unable to capture all of the gases sent to the flare.

Root Cause of Incident:

Mechanical failure of crude gas compressor while spare compressor was out for maintenance.

Contributing Causes of Incident:

Spare compressor was unavailable as it was out for maintenance.

Preventative Actions (Actions to reduce likelihood of Recurrence):

The following have been completed:

- **Repaired the main rotor by replacing the damaged pole winding**
- **Replaced the bolts/nuts for the pole winding with bolts of appropriate specification**
- **Main rotor was cleaned, baked, electrically tested**
- **Main stator damaged top sticks were replaced, stator cleaned and electrically tested**
- **Both exciter rotor and stator were tested and repaired where necessary**

Do Stipulated Penalties Apply? (Acid Gas Flaring Only) YES ☐ NO ☒

If YES explain:

☐ Yes ☐ No **Error resulting from careless operation.**
☐ Yes ☐ No **Failure to follow written procedures.**
☐ Yes ☐ No **Failure of equipment due to failure by Sunoco to operate and maintain equipment in a manner consistent with good engineering practices**
☐ Yes ☐ No **SO_2 rate greater than 20 lbs/hour continuously for 3 hours or more where SUNOCO did not follow PMO plan and took no action to limit duration and/or quantity of SO_2 emissions.**
☐ Yes ☐ No **More than five acid gas flaring incidents in rolling 12 months period.**

If NO explain:

Hydrocarbon Flaring Event

If corrective actions are not completed within 45 days from the end date of the incident, list the projected date for the follow-up report which will show corrective actions and preventive actions:

N/A: ☐ **Completed:** ☒ **Not Completed:** ☐ **Explain:**

Approval Section		
Title	**Print Name**	**Date**
Environmental Engineer:	Jacqueline Hom	07/17/2014
Environmental Manager:	Charles D. Barksdale Jr.	07/17/2014
Operations Director:	Edward Deni	7/25/2014

APPENDIX I

Philadelphia Refinery

1. CD Paragraph 77(B)(i)(3) Sampling Results Philadelphia Refinery

Sample Point ID	Sample Date	Benzene Conc (ppmw)	Avg 1st Qtr 2014 Benzene Conc. (ppmw)	Avg 2nd Qtr 2014 Benzene Conc. (ppmw)	1st Qtr 2014 Flow (gal)	2nd Qtr 2014 Flow (gal)	1st Qtr 2014 Benzene Quantity (Megagrams)	2nd Qtr 2014 Benzene Quantity (Megagrams)
210 Box Cooler (PB EOL 001)	01/13/14	0.00099	0.007		74235000		0.002	0.0003
	02/11/14	0.02						
	03/10/14	0.00099						
	04/23/14	0.00099		0.00099		74235000		
	05/20/14	0.00099						
	06/10/14	0.00099						
Klondike Effluent (PB EOL 002)	01/15/14	0.00099	0.008		10000000		0.0003	0.0001
	02/11/14	0.023						
	03/10/14	0.00099						
	04/23/14	0.005		0.003		10000000		
	05/20/14	0.003						
	06/10/14	0.001						
867 Effluent (PB EOL 003)	01/15/14	0.006	0.003		22625000		0.0003	0.002
	02/12/14	0.002						
	03/11/14	0.00099						
	04/24/14	0.00099		0.02		22625000		
	05/21/14	0.00099						
	06/11/14	0.054						
PB Grit Chamber Effluent (PB EOL 004)								
No samples taken this period - not required. Grit chamber samples were only required to be sampled for one quarter and this had already occurred in early 2008.								

Sample Point ID	Sample Date	Benzene Conc (ppmw)	Avg 1st Qtr 2014 Benzene Conc. (ppmw)	Avg 2nd Qtr 2014 Benzene Conc. (ppmw)	1st Qtr 2014 Flow (gal)	2nd Qtr 2014 Flow (gal)	1st Qtr 2014 Benzene Quantity (Megagrams)	2nd Qtr 2014 Benzene Quantity (Megagrams)
1232 4th and M (GP EOL 001)	01/13/14	0.027	0.1		71500000		0.03	0.2
	02/12/14	0.25						
	03/10/14	0.089						
	04/24/14	2.1		0.7		71500000		
	05/21/14	0.061						
	06/11/14	0.027						
231 F Box Discharge (GP EOL 002)	01/15/14	0.17	0.2		3450000		0.003	0.001
	02/12/14	0.18						
	03/11/14	0.22						
	04/24/14	*Invalid Sample		0.08		3450000		
	05/21/14	0.035						
	06/11/14	0.13						

Sample Point ID	Sample Date	Benzene Conc (ppmw)	Avg 1st Qtr 2014 Benzene Conc. (ppmw)	Avg 2nd Qtr 2014 Benzene Conc. (ppmw)	1st Qtr 2014 Flow (gal)	2nd Qtr 2014 Flow (gal)	1st Qtr 2014 Benzene Quantity (Megagrams)	2nd Qtr 2014 Benzene Quantity (Megagrams)
231 Groundwater (GP EOL 003)	01/2014	*No sample	*0		*0		*0	*0
	02/2014	*No sample						
	03/2014	*No sample						
	04/2014	*No sample		*0		*0		
	05/2014	*No sample						
	06/2014	*No sample						
* Groundwater system not operational at the time of sampling.								
#3 Separator Effluent (GP EOL 004)	01/13/14	0.00099	0.00099		3150000		0.00001	0.00001
	02/18/14	0.00099						
	03/10/14	0.00099						
	04/23/14	0.00099		0.00099		3150000		
	05/20/14	0.00099						
	06/10/14	0.00099						
8 Separator Effluent (GP EOL 005)	01/14/14	0.02	0.01		8300000		0.0003	0.0002
	02/12/14	0.017						
	03/11/14	0.004						
	04/23/14	0.001		0.007		8300000		
	05/20/14	0.019						
	06/10/14	0.00099						
15 Pumphouse (PB Non-EOL 001)	01/16/14	0.006	62		15000		0.004	0.000002
	02/11/14	5.3(w) 90% 1800(p) 10%						
	03/12/14	0.005						
	04/23/14	0.086		0.03		15000		
	05/20/14	0.00099						
	06/10/14	0.00099						

Sample Point ID	Sample Date	Benzene Conc (ppmw)	Avg 1st Qtr 2014 Benzene Conc. (ppmw)	Avg 2nd Qtr 2014 Benzene Conc. (ppmw)	1st Qtr 2014 Flow (gal)	2nd Qtr 2014 Flow (gal)	1st Qtr 2014 Benzene Quantity (Megagrams)	2nd Qtr 2014 Benzene Quantity (Megagrams)
1232 Sewer M Street (GP EOL 006)	01/15/14	0.048	0.03		4700000		0.0005	0.02
	02/12/14	0.016						
	03/11/14	0.011						
	04/24/14	25(p) 10% 0.014(w) 90%		0.9		4700000		
	05/21/14	0.0099						
	06/11/14	0.005						
V-4 Hydrobon Separator Condensate Wash (GP Non-EOL 001)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No waste was generated from this Non-EOL point during the semi-annual period.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
V-603 Debutanizer Receiver Condensate Wash (GP Non-EOL 002)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No waste was generated from this Non-EOL point during the semi-annual period.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

1st Qtr 2014 EOL Sampling TAB = 0.04 Megagrams
2nd Qtr 2014 EOL Sampling TAB = 0.22 Megagrams

Projected annual 2014 EOL sampling TAB = 0.52 Megagrams

Notes:

1. *Benzene concentrations listed as 0.00099 ppm were reported by the laboratory as < 0.001 ppm which is the detection limit.*

2. *Average quarterly benzene concentrations are simply the arithmetic mean of the individual laboratory results for the quarter.*

3. Sample calculation of 1st Qtr Benzene Quantity for GP EOL 002:

1st Qtr avg benzene conc. = 0.2 ppm
1st Qtr flow = 3,450,000 gallons

So: $\frac{0.2 \text{ ppm benzene} \times 3{,}450{,}000 \text{ gallons} \times 8.34 \text{ lbs/gallon}}{2204.6 \text{ lbs/megagram} \times 1{,}000{,}000 \text{ parts per million}} = 0.003$ Megagrams